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THE DEVELOPMENT OF OBSERVATION STUDENT WORKSHEET IN ENGLISH VERSION OF INVERTEBRATES FOR GRADE X BASED ON SCIENTIFIC APPROACH

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Abstract

Animalia Kingdom is one of biology topics in grade X that use observation activity in its learning. Teaching materials that contain student activities by making observations are needed to create active and effective learning. This research aimed to produce Observation Student Worksheet in English Version Invertebrates Materials for Grade X Based on Scientific Approach as well as describe its validity, practicality, and effectivity. The development of student worksheet was conducted at Biology Department, The Faculty of Mathematics and Natural Science, Universitas Negeri Surabaya used 4D Model (Define, Design, Develop, Disseminate) and for the Disseminate stage not done. The trial was implemented in SMA Negeri 1 Bojonegoro using one group pretest and postest design. The data of student worksheet validity, practicality, and effectivity was analyzed descriptive qualitatively. Based on validation result, student worksheet was valid (score 3.79). Based on learning effectiveness, student worksheet was practical (score 94.07%), students also give positive response to the worksheet (90.67%). The student worksheet was effective, based on the study result (80% of students can master the lesson). Based on the data obtained and analyzed, student worksheet was feasible to use in terms of validity, practicality, and effectiveness.

Key word*:* observation, student worksheet, scientific approach, invertebrates.

INTRODUCTION

The 2013 Curriculum is a curriculum that focuses on learning process that students were initially told to be students who find out. The common learning activites started by teacher giving information as learning source, meanwhile in implementation of 2013 Curriculum, the learning avtivities started by observation certain facts or phenomena by the student (Daryanto, 2014).

Learning activity in 2013 Curriculum uses learning models, learning methods, learning media, and learning resources that are appropriated to students characteristics. One of approach that used in 2013 Curriculum is scientific approach. It can be done with observing, asking, collecting data, associating, and to communicating (Kemendikbud, 2016).

Biology is one branch of science that focus on trial and observe to concolidate the concept that student received (Wisudawati, et al., 2014). Animalia Kingdom is one of biology material in grade X that used observed activity in its learning. In invertebrates material, there is an activity to observe morphology of the body and apply the classification principle to classify based on their same characteristics. Observing and classifying activities are part of basic process skills. Appropriate with 2013 Curriculum, these skills need to be trained so the students gain the direct learning experience. The basic competence can be achieved through observation activities (Daryanto, 2014).

Using the scientific approach in learning process of 2013 Curriculum requires teachers to organize the learning process in such a way that learning in the classroom is more active and effective. Creating active and effective learning can be done by preparing learning tools. One component of learning tools is student worksheet which contain learning activities that involve students by making observation. Observation student worksheet are sheets that contain steps of observation activity and

questions that must be done by students based on observation that have been made (Yulianti, et al., 2014).

According to Sudargo and Soesy (2009) based on empirical observations in real, the main constraints faced by teachers in implementing biology leraning are the limitations of teachers in managing practicum learning, limited time, and too large classes.

In 2013, RSBI was abolished by Constitutional Court. However, some of ex RSBI that are currently changing their names to referral schools still maintain the use of English in learning such as, SMA Muhammadiyah 2 Surabaya, SMA Al Hikmah Surabaya, SMAN 2 Lamongan, dan SMAN 1 Bojonegoro. English laguage skills become a necessity for every individual who cannot be avoided. Therefore, teaching materials are needed in English version of learning activites.

The student worksheet usually purchased and not been made by the teacher so that it only contain a description of the material and the competency test questions at the end of the material. In addition, student worksheet that purchased also uses Indonesian. Based on the results of the student worksheet analysis conducted by Hamimi, et al. (2014) to six schools in Jombang and one school in Surabaya showed that student worksheet which used was still limited to training in observing and classifying skills. In addition, there is no English version of student worksheet in real. This is similar to the results of observations and interviews at SMAN 1 Bojonegoro, student worksheet that used is not made by the teacher but it used student worksheet Indonesian version, so it only contain a description of the material and the competency test questions at the end of the material.

Based on this, that it need to develop Observation Student Worksheet in English Version of Invertebrates Materials for Grade X Based on Scientific Approach. This study aims to produce validity, practicality, and effectivity of student worksheet that can be used in learning.

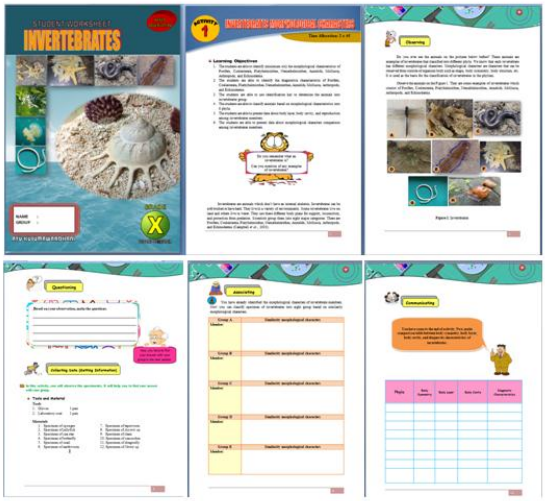
METHODS

This type of research was developmental research. The developed product is Observation Student Worksheet in English Version of Invertebrates Materials for Grade X Based on Scientific Approach used 4D Model (Define, Design, Develop, Disseminate). However, the disseminate stages was not carried out. The study was done in February 2016 until September 2018. The trial was implemented in April 2018 at SMA Negeri 1 Bojonegoro.

The target in this study were Observation Student Worksheet in English Version Invertebrates Materials for Grade X Based on Scientific Approach which tested its feasibility based on validity, practicality, and effectivity by validation and limited trials. Student worksheet is valid if it gain the score of ≥ 2,51. Student worksheet is practical if activities of student worksheet reached ≥ 76%. Student worksheet is effective if ≥ 61% of students can master the lesson based on KKM (score ≥ 75) and ≥ 61% of students gained an increase in study result based on n-Gain criteria ≥ 0,3. Students give positive response to the worksheet collected by using quistionaire if the positive response given by students is ≥ 70%.

RESULTS AND DISCUSSION

The observation student worksheet contain learning activities that involve students by making observation. It consists of two activities. Activity 1



consists of observing invertebrate morphological characteristics and invertebrate classification. While activity 2 consists of activities to find the role of invertebrates in life, both positive and negative roles.

Picture 1. Observation student worksheet in english version of invertebrates

Based on the research that have been done, it obtained data of student worksheet validity, practicality, and effectivity. Student worksheet validity based on expert validation obtained a score of 3,79 with very valid category (Table 1)

Table 1. Recapitulation of Student Worksheet Validation Results

No	Assesment	Validator 1	2	3	Score of each criteria	Score of each feasibility
A.	**Feasibility of Content**					
1.	Suitability of learning objectives and material content with main competence and basic competence.	3	4	4	3.67	3.83
2.	The truth of the invertebrates material contents in student worksheet	4	4	4	4	
B.	**Feasibility of Languages**					
1.	Communicative and straightforward	4	4	4	4	3.83
2.	Use of English	3	4	4	3.67	
C.	**Feasibility of Presentation**					
1.	Appropriate appearance with material content	4	4	4	4	3.66
2.	Completeness of student worksheet section	3	4	3	3.33	
D.	**Graphics**					
1.	Format of student worksheet	4	4	4	4	4
2.	Design of student worksheet cover	4	4	4	4	
E.	**Characteristics of observation student worksheet**					
1.	Student worksheet motivates students to carry out activities	3	3	4	3.33	3.66
2.	Observation student worksheet appropriate with 2013 Curriculum	4	4	4	4	
Average score of student worksheet validity						**3.79**

Noted:
Validator 1: Education Expert
Validator 2: Material Expert
Validator 3: Biology Teacher

Student worksheet practicallity in term of implementation of student worksheet obtained a percentage of 94,07% in the practical category (Table 2)

Table 2. Recapitulation of Result From Student Worksheet Implementation *Activity* 1

No	Activity	Σ Student Implementation	% Activities carried out
1	Students listen to the teacher's explanation to show interest in the topic.	15	100
2	Students read material at student worksheet to motivate initial knowledge.	15	100
3	Students write at least one question based on the observation of the picture and the question and answer that has been done.	12	80

4	Students prepare the tools needed for the observation activities to be carried out.	14	93,33
5	Students prepare the materials needed for the observation activities to be carried out.	14	93,33
6	Students look at procedures before carrying out activities.	15	100
7	Students observe learning resources for information (preservation of invertebrate animals, images, articles, and videos).	15	100
8	Students collect data observation and make tables of observations that have been provided.	15	100
9	Students present data obtained with words that are easy to understand and not double meaning.	15	100
	Average Student Worksheet Implementation Score		**96.29 (Practical)**

Table 3. Recapitulation of Result From Student Worksheet Implementation *Activity* 2

No	Activity	Σ Student Implementation	% Activities carried out
1	Students listen to the teacher's explanation to show interest in the topic.	15	100
2	Students read material at student worksheet to motivate initial knowledge.	15	100
3	Students write at least one question based on the observation of the picture and the question and answer that has been done.	14	93,33
4	Students prepare the tools needed for the observation activities to be carried out.	9	60
5	Students prepare the materials needed for the observation activities to be carried out.	14	93,33
6	Students look at procedures before carrying out activities.	15	100
7	Students observe learning resources for information (preservation of invertebrate animals, images, articles, and videos).	14	93,33
8	Students collect data observation and make tables of observations that have been provided.	15	100
9	Students present data obtained with words that are easy to understand and not double meaning.	13	86,67

Average Student Worksheet Implementation Score	**91.85 (Practical)**

The effectiveness of student worksheet was assessed from students learning outcomes and responses. Assessment of student learning outcomes consists of completeness of learning outcomes and achievement of learning indicator after using the Observation Student Worksheet in English Version of Invertebrates Materials.

Table 4. Student learning outcomes at pretest and posttest

Student	Pretest	Postest	Gain Score	Interpretation
1	30	96	0.94	High
2	40	83	0.75	High
3	23	83	0.78	High
4	46	83	0.68	Medium
5	16	83	0.78	High
6	33	80	0.70	High
7	53	80	0.57	Medium
8	53	80	0.57	Medium
9	36	80	0.69	Medium
10	26	76	0.67	Medium
11	63	76	0.35	Medium
12	36	76	0.62	Medium
13	36	73	0.58	Medium
14	40	73	0.55	Medium
15	20	70	0.62	Medium
Average	**36,73**	**79,47**	0.66	Medium

Table 5. Recapitulation of Achievement from Learning Indicator

Indicator	Question Item	Pencentage of Achievement (%)	Criteria
Identify morphological features of invertebrate animal	1	76.11%	Achieved
Identify special characteristics of invertebrate animal groups	1	56.67%	Not Achieved
Use identification keys to determine group of invertebrate animals	1	91.11%	Achieved
Classify invertebrate animals based on observed morphological characteristics	1	80.83%	Achieved
Explain the role of invertebrates in life	1	86.67	Achieved
Average		**78.28**	Achieved

Table 6. Recapitulation of Percentage from Student Responses

No	Question	Total Positive Response of Students	Percentage (%)
A.	**CONTENT CRITERIA**		
1.	Learning material in student worksheet is appropriate with the topic of the material.	15	100
2.	This description or explanation in student worksheet was easy to understand.	15	100
3.	Students enjoy learning Invertebrate material using this student worksheet during learning activities.	14	93.33
B.	**CRITERIA OF HUMANITY**		
1.	The language used in student worksheet was easy to understand.	12	80
2.	This student worksheet uses the language commonly used.	9	60
3.	English was used appropriate with the	11	73.33

	level of development of student's thinking.		
	C. PRESENTATION CRITERIA		
1.	This student worksheet appearance get your desire to learn.	13	86.67
2.	This procedure in student worksheet is easy to do.	15	100
3.	This student worksheet presentation is interesting and fun.	13	86.67
	D. CRITERIA OF GRAPHICS		
1.	The images displayed on student worksheet help you understand the material.	14	93.33
2.	The appearance of this student worksheet is interesting.	14	93.33
3.	The student worksheet cover is interesting.	14	93.33
4.	The font size in student worksheet is appropriate and can be read.	15	100
	E. CHARACTERISTICS OF OBSERVATION STUDENT WORKSHEET		
1.	This student worksheet provides initial information regarding the material being studied.	15	100
2	Work procedures in the observation process in student worksheet are structured so that it can guide you to discover the concept of the material being studied.	13	86.67
3.	This student worksheet provides a place to write data observation.	15	100
	F. RESPONSE TO THE USE OF STUDENT WORKSHEET		
1.	Learning to use student worksheet by observing animal preservation is something new for students.	13	86.67
2.	This student worksheet can help you in learning the concept of Invertebrates.	14	93.33
3.	Students prefer to learn by carrying out activities directly.	14	93.33
	AVERAGE		**90.67**

The validity of Observation student worksheet in English version of Invertebrates material based on feasibility of content, feasibility of languange, feasibility of presentation, graphics, and characteristics of observation student worksheet shows **very valid** interpretation (Table 1). This shows that the student worksheet developed was in accordance with the reference for the preparation of student worksheet that is good and feasible to be applied in classroom learning activities. Observation student worksheet in English version of Invertebrates material were in accordance with good student worksheet requirements, namely 1) there was a student worksheet identity; 2) the suitability of the student worksheet title with the taught material and the student worksheet cover made; 3) letters and writing on student worksheet using printed letters; 4) student worksheet's appearance can arouse student's interest and motivation; 5) suitability of sentence structure in student worksheet with student age; 6) suitability of student worksheet material with relevant literature and applicable curriculum; and 7) could train the process skills (Depdiknas, 2004: Widjajanti, 2008: Prastowo, 2013). In addition, the preparation of student worksheet was in accordance with the stages of learning by using a scientific approach that includes five learning experiences namely observing, asking questions, collecting data, associating, and communicating. This can be seen in

the details of student worksheet activities that have been designed to help students understand the concept of invertebrates through observations on objects and provide independent assignments (Mustofa, 2013).

The content feasibility of the developed student worksheet gets a score of 3.83 with a very valid interpretation category. These result was obtained because of the suitability of the learning objectives and the content of the material on the curriculum requests listed in the main competence and basic competence. Based on this, Kaymakci (2012) stated that the tasks given in student worksheet must be in accordance with the learning objectives to be achieved. Prastowo (2013) added that a worksheet must appropriate with the criteria related to the achievement of basic competence that must be mastered by students. Observation student worksheet appropriate with the criteria of student worksheet content which includes concepts and facts presented in student worksheet. The criteria of student worksheet content were appropriate with the facts, related to the activities carried out by students in student worksheet using invertebrate animals as well as providing information about the role of invertebrates based on fact data that has been scientifically proven.

The practicality of student worksheet developed in terms of the implementation of learning. After limited trial was conducted, it was known that the implementation of Activity 1 has an average percentage of implementation of 96.29% with a **practical** category. It shows that the student worksheet has been validated can be used easily in learning activity. Almost all activities in Activity 1 were carried out well by students during learning activities. In writing activities, student made at least one question based on the observation of the picture also from the question and answer that has been done, the activity gets the lowest score of 80%. This was because students have not been accustomed to doing these activities in previous learning. So students feel less confident to express ideas or opinions. This was appropriate with the statement of Arends (2012), that in carrying out activities that require a skill, repetition is needed as an exercise to be able to carry out activities smoothly.

In Activity 2, the developed student worksheet was **practical** based on observations of student activities with an average value of 91.85%. This shows that almost all activities in Activity 2 are carried out well by students. There was progress in student's activities to write at least one question based on the observation of the picture and the question and answer that had been done from the previous meeting, namely getting a score of 93.33%. At the second meeting, students preparing the tools needed for observing activities to be carried out get the lowest score, which was 60%. This was because in watching video activities, each group was asked to observe videos using laptops. Many groups only use one laptop in one group, only one to two people in one group prepare the tools needed for observation activities.

Besides implementation of learning, aspects of student worksheet practicaly were also seen from the responses given by students to student worksheet. Based on student responses, it can be seen that students respons positively by 90.67% with **good** categories. There were 60% of students feel it was not easy to understand the questions and descriptions contained in student worksheet because it was in English version. This was because students have different abilities in learning material in English, so it was necessary to add a bilingual dictionary to difficult words for students.

The effectiveness of student worksheet was reviewed based on study result. Based on the analysis of the completeness of student learning outcomes and improvement of student learning outcomes (Table 3) it can be seen that 80% of students completed with an increase in learning outcomes of 0.66 with the **medium** category. This shows that the learning process causes an increase in the value of learning outcomes that are good enough both by student can master the lesson and students who were not master the lesson. After doing t test with a confidence level of 95% and alpha 0.05 shows t count (11.121)> t table (2.14). Based on this, it was known that the pretest differ significantly with the posttest and the posttest value was better than the pretest value.

Based on the results obtained, it was known that student worksheet can improve student's conceptual understanding of the material. This was because the activities in student worksheet are designed so that students can find concepts independently. Based on the theory of constructivism, a person will learn if he was active to construct knowledge in his brain so that he makes that knowledge his own. One way to implement this theory in learning was to package learning material in the form of student worksheet which contains investigation activities so that students can find a concept (Prastowo, 2013). According to Fatmasary and Supriyanto (2015), good student worksheet on active learning was a student worksheet that can encourage students to think high order thinking with questions that can only be answered after students take action, not just superficial questions in the form of points must be filled by students.

Based on the analysis of the completeness of the indicators on the posttest, the indicator with the highest completeness was the identification key to determine the group of invertebrate animals. The score obtained is 91.11%, meaning that students have been able to use identification keys to determine groups of animals in invertebrates. The lowest percentage of indicator achievement is 56.67%. The average student was only able to identify one diagnostic characteristics of the two characteristics requested. According to Ibrahim (2010), identifying is one form of remembering ability which means the ability to localize knowledge contained in long-term memory so that it is appropriate with the material being taught.

Based on the results of the research carried out, it was found that the observation student worksheet that were developed obtained good research results. It was known based on the results of validation, implementation, learning outcomes, and also student responses. Based on the validity, practicality, and effectiveness, the student worksheet developed was feasible to use, because based on expert validation, it got a score of 3.79 with a very valid category, based on student worksheet implementation, obtaining a percentage of 94.07% with a practical category and the percentage of the average score of the positive response of students was 90.67% and belongs to the good category, based on learning outcomes showing the percentage of students mastered was 80% which belongs to the effective category.

CONCLUSION

Based on the results of the research carried out, a valid, practical and effective Observation Student Worksheet in English Version of Invertebrates Materials for Grade X Based on Scientific Approach was produced. Based on the validity, practicality, and effectiveness, the student worksheet developed is feasible to use, because based on expert validation, it got a score of 3.79 with a very valid category, based on student worksheet implementation, obtained a percentage of 94.07% with a practical category and the percentage of the average score of the positive response of students was 90.67% and belongs to the good category, based on learning outcomes showing the percentage of students mastered was 80% which belongs to the effective category. Based on the data obtained and analyzed, student worksheet was feasible to use in terms of validity, practicality, and effectiveness.

SUGGESTION

This research was a development research that was carried out until the limited trial stage, so that there is a need for improvements and trials to develop student worksheet so that it becomes better.

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